TALE - 2 Course Design and Instruction of Engineering Courses

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Lecture – 20
Instructional Situations

Greetings and welcome to TALE Module 3 Unit 2 on Instructional Situations.

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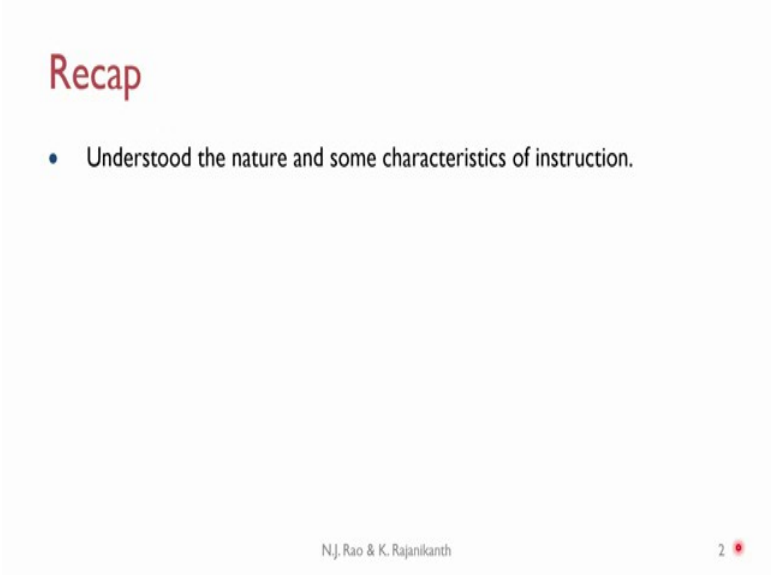

In the earlier unit we understood the nature and some of the characteristics of instruction. What instruction is all about and the issues that need to be looked at were looked in brief, or we had an overview of that.

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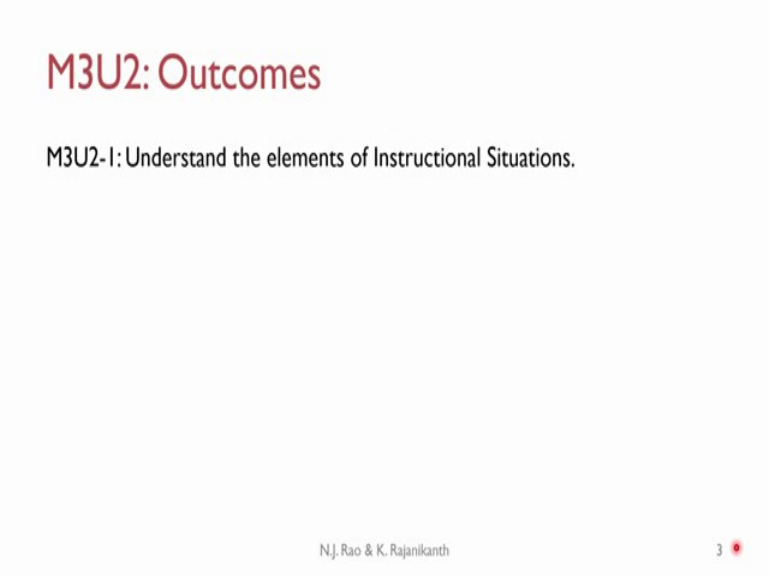

One of the first elements of the instruction is to understand how to classify instruction. There are any number of ways. We will look at instructional situations. The main aim of this unit is to understand the elements of instructional situations.

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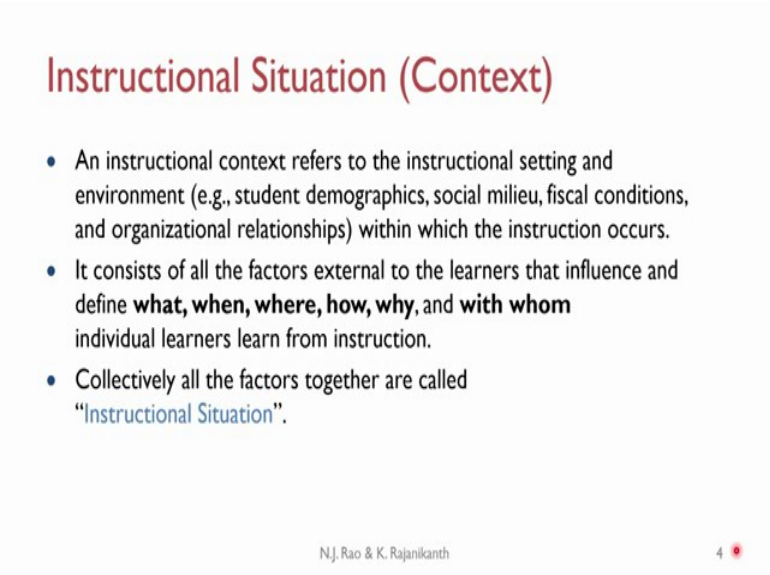

What do we mean by instructional situations? It can also be called context, because any course that you offer is offered in one context. For example, all institutions are not the same, after all they are physically located at different places, and the kind of classrooms

at each institute will be different, the kind of students that each institute will have will also be different, the faculty that are the available are different and so on and on.

Therefore, the context in which you are conducting a course will be different from one place to the other. An instructional context refers to the instructional setting and environment. It could be student demographics, social milieu, fiscal conditions and organization relationships within the institute, within which the instruction actually takes place.

All the factors external to the learner influence and define what, when, where, how, why and with whom individual learners learn from instruction. If you take an IIT and the newly opened Rural Engineering College - the contexts are not the same. The teachers who offered courses cannot completely overcome the influence of the situation or the context to conduct the course.

Sometimes you cannot even aim at what one institution can do, even though the subject matter approximately remains the same. Collectively all the factors together are called instructional situation.

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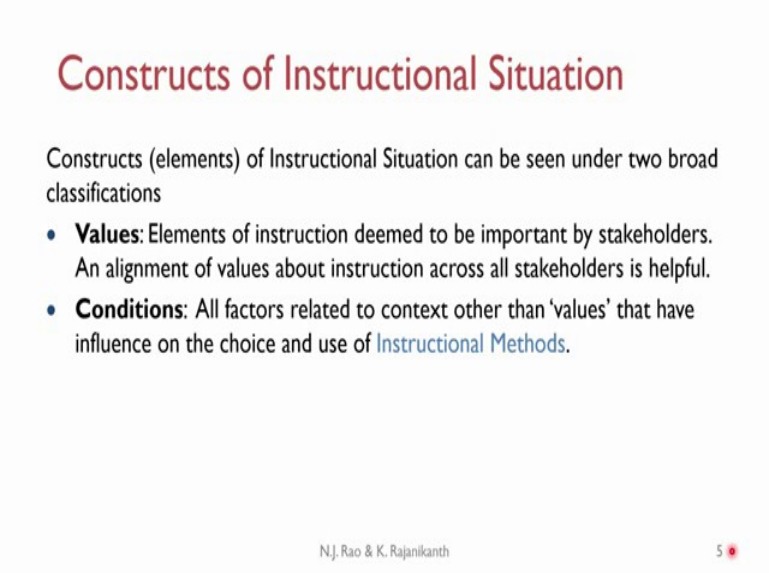

How do I classify? Classification is not anything unique, in the literature these instructional situations are classified in many ways. Broad classification of Instructional Situations is value and conditions. Values refer to elements of instruction deemed to be

important by the stakeholders, because the stakeholders are different for different institutions.

For example, consider NIT; NIT will have is governed by some board of governors or a governing council, various academic bodies and there whole lot of the structure or the role of stakeholders, what they considered important are very different from a private privately run self financed college. This is where the issue comes.

In any institute you have several stakeholders; like the management, academic council, boards of studies, the teachers themselves, students, parents and so on. Each one of these stakeholders has different levels of influence on how the instruction should take place.

But an alignment of values about instruction across all stakeholders is helpful. If they are not in alignment; that means, what the management expects and what the teacher wants to do - if they are at variance; obviously, a good instruction may not take place. The teacher may still follow what is dictated by the management, but he will not be really be happy in doing a course if it is not in alignment with the values of other stakeholders.

Conditions: all factors related to the context other than values that have influence on the choice and use of instructional methods. Several conditions that come other than values, some are listed here, hopefully they absorb all the issues of all the conditions that are important to conducting instruction.

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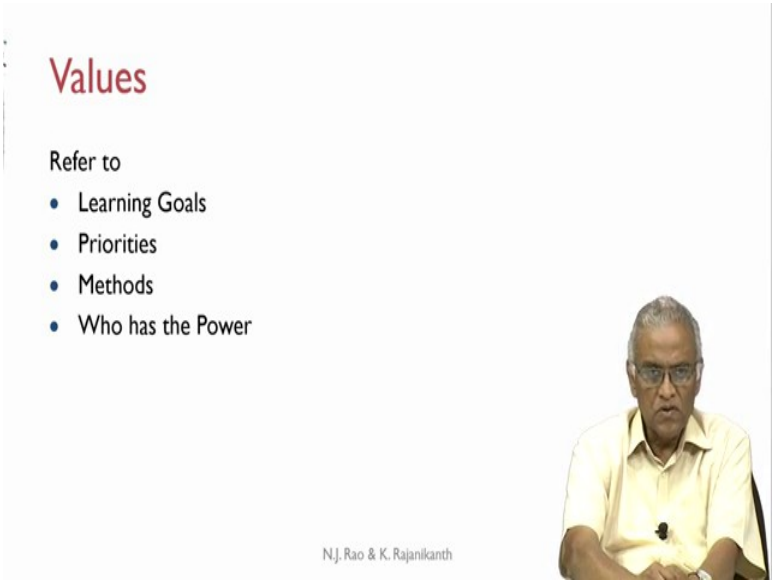

The values refer to learning goals, priorities, methods and who has the power in making decisions.

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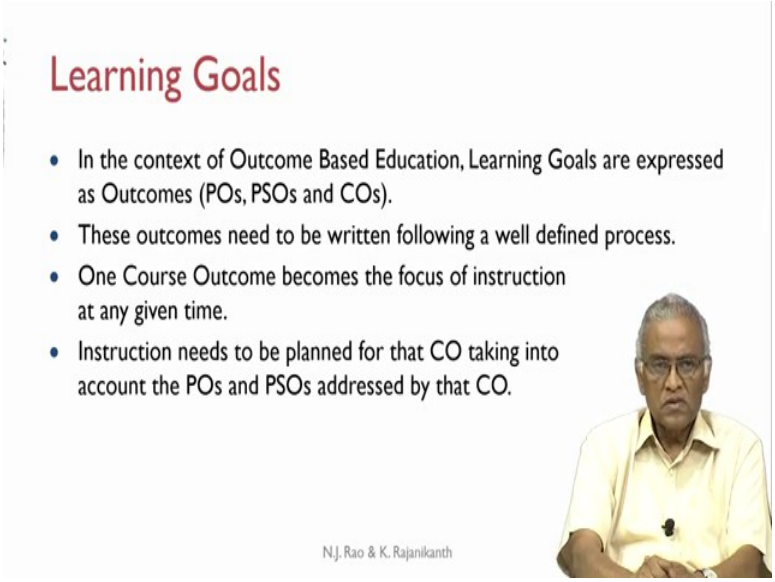

Learning goals: The curriculum itself is a learning goal. The curriculum consists of several courses, projects, and so on, but for an individual teacher, especially in the context of outcome-based education, learning goals are expressed as outcomes (program outcomes, program-specific outcomes, and course outcomes.) POs are already given by National Board of Accreditation. PSOs - individual teacher does not choose; it is a department that chooses.

The choice that is there with the teacher (in autonomous institutions) is with regard to COs. If it is an affiliated college, even the COs are written by a Board of Studies. Writing COs alone does not guarantee that you meet your learning goals. These outcome statements should be written following a well-defined process. Because the statement of CO should not vaguely represent what is to be done, what should be the goal, it should be very clearly enunciated (please see in TALE module 1.)

At any given instant of time or in any classroom - one-course outcome becomes the focus of instruction because when I walk into the class, I am addressing one course outcome. Obviously, instruction needs to be planned for that CO taking the POs and PSOs addressed by that CO into account. This issue of which PO which PSO needs to be addressed by that CO has been explored in detail in Module 1.

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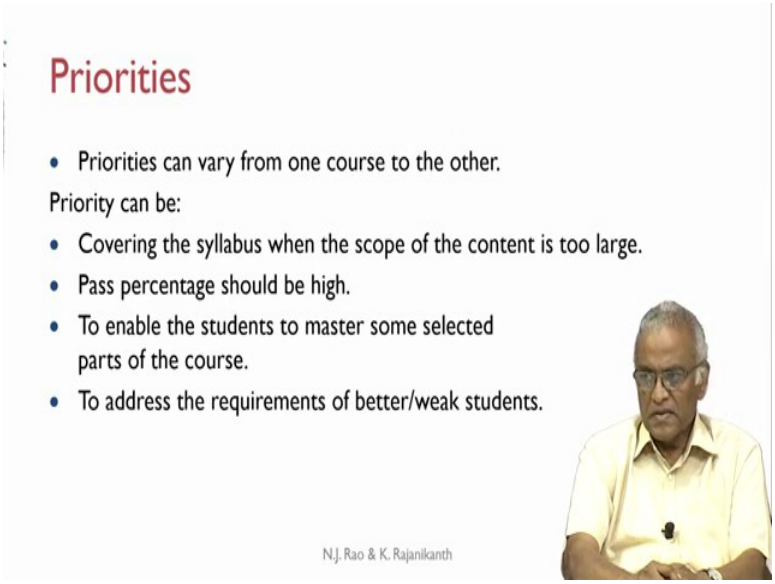

Priorities: Priorities can vary from one course to the other. Many Universities/Boards of Studies do make this error - overload the content for a given course. Content is disproportionate to the number of sessions that are available to the teacher. When the content is too large, the priority becomes covering the syllabus, how do I quickly run through the class, instead address every part of the content. This is because the teacher should not be faulted for "this particular chapter or the section is not covered." Therefore covering the syllabus becomes the priority.

Sometimes even if available sessions are not enough, people are forced to take additional sessions. Yet in another course the pass percentage should be high that will be dictated by the management or head of the department. Pass percentages cannot come down because then the college will have to face other consequences. In some cases (autonomous institutions) a teacher has a little more control, but one can also make an error with regard to topics as a teacher may have preference for some of the topics.

To enable the students to master some selected parts of the course becomes the priority. The teacher considers some topics more important than others, or he likes those topics. Either way, the teacher may focus on some topics more than the others, which becomes the teacher's priority. Sometimes the priority could be how to address the requirements of weak students or sometimes the better students. If you try to take one particular way of instructing better students who may get bored, weak students may not be able to catch

them. Then the teacher is required to address the requirements of one of these. The priorities vary from one course to the other, not only because of the content, also the preference of the teacher or the other stakeholders' preferences.

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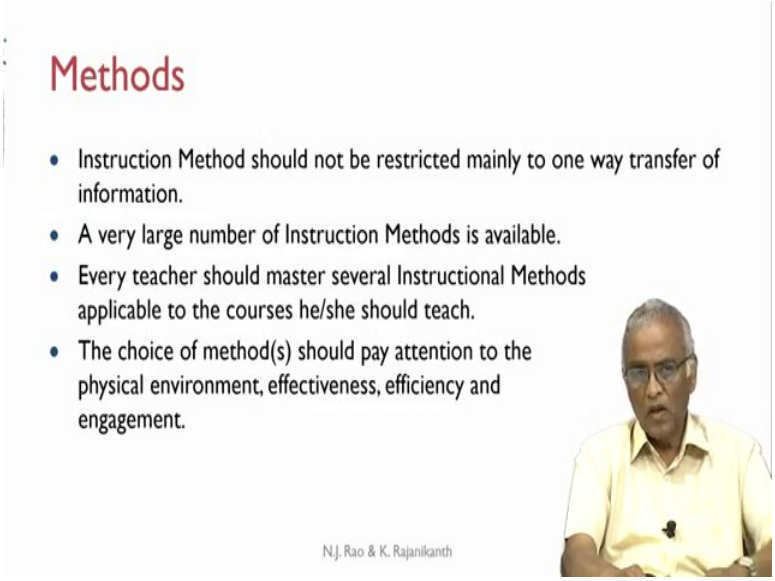

Instruction method: What is the method by which I am facilitating my students to learn. The most preferred, almost 99 percent of the time, instructional method is lecturing which you can also call one-way transfer of information. When you lecture, however knowledgeable the teacher is; however useful the presentations are in the classroom, most of the time in the classroom is spent in transfer of information one way.

However, a large number of instruction methods are available to the teacher. But just because they are available, it does not mean they are used, and it does not mean that every method is preferred or liked by all teachers and so on.

Every teacher should actually explore some of these instruction methods, and based on his preference with regard to the subjects he is handling, and he should make those methods his own. He can make minor modifications to the details, but he must create, he must own those methods, and they become his preferred methods of instruction.

Of course, the choice of the methods should pay attention to the physical environment (we will presently see what that is) and how effective they will be. Sometimes some

methods broadly address that the lecture could be interesting and motivating but not effective.

Effective in the sense, the intended learning goal has to be met/attained. If it is not attained you are only generally going in that direction, which is not sufficient. It should be reasonably efficient because it should not take to much time to communicate one concept. The most important thing is for students to learn; they should engage with the knowledge that is being presented. Engagement should not be restricted to passive listening (that is what unfortunately happens most of the time.)

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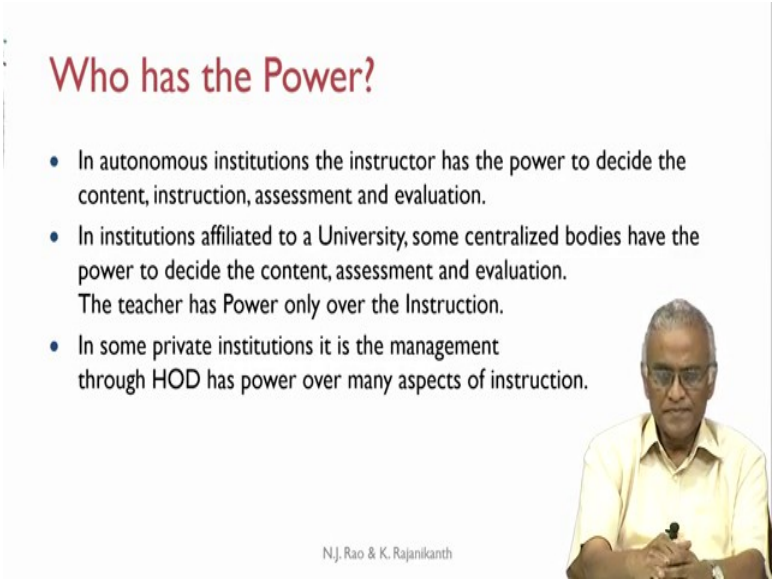

Who has the power? In autonomous institutions, the instructor has the power to decide the content or, at least to a large extent, in instruction, assessment, and evaluation. He has some kind of control over all four parts. For example, he does not have unlimited freedom on content; he can design the course and have it wetted by the department, academic committee, etc., and subsequently wetted by the Board of Studies.

It is possible in most of the cases in autonomous institutions, the first level of design of content or the choice of the contents rests with the teacher. Subsequently, instruction, assessment, and evaluation are in the hands of the teacher. Institutions affiliated to University, it is some centralized bodies, like Boards of Studies and Academic Councils, or the Controller of Examinations who are at a distant place, have the power to decide

the content, assessment, and evaluation. The teacher has power only over the instruction; sometimes, he may not even have that.

In some private institutions, it is the management through HOD has power over many aspects of even instruction. Whether it is stated explicitly or only known implicitly will have a significant influence on how you conduct your instruction.

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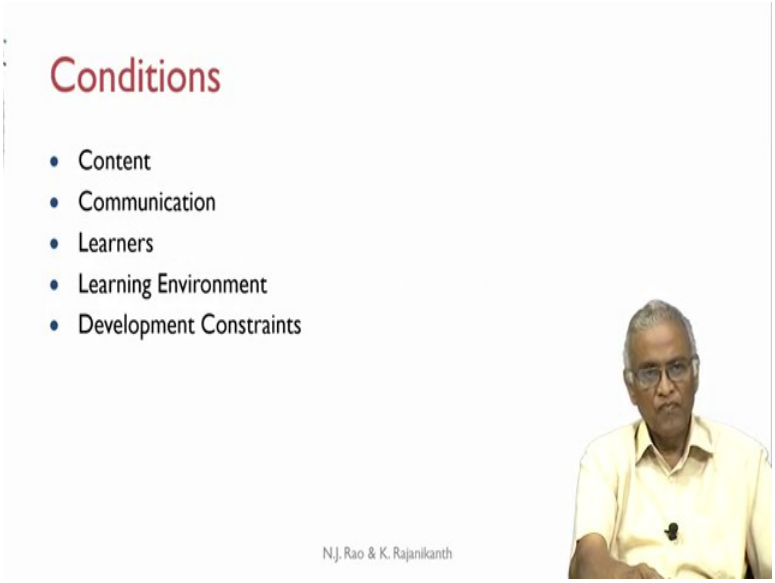

Conditions: I am listing 5 here, but you can add more, or you can bring other conditions that are not addressed here. Content, Communication, Learners, Learning Environment and Development Constraints are the five conditions that we will discuss.

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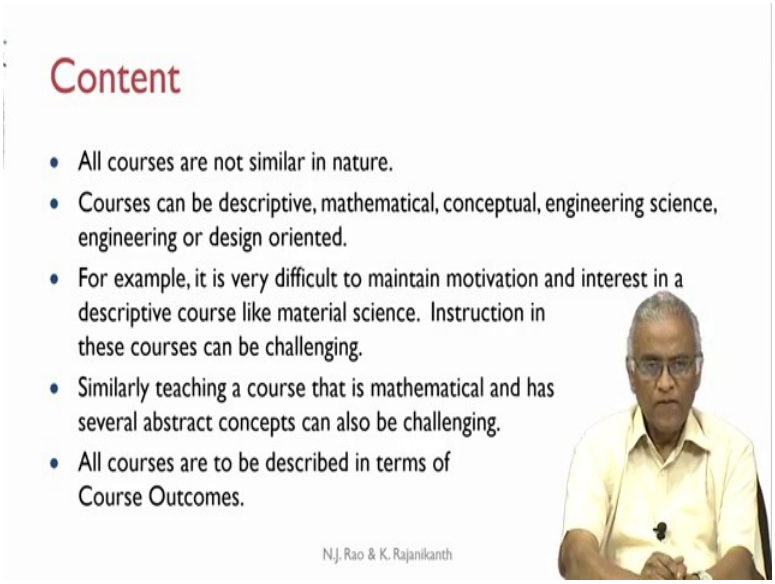

Content: All courses are not similar in nature, so an instruction method that is applicable to one type, of course, is not necessarily the best for some other type of course. Courses can be descriptive, mathematical, conceptual, or engineering science or engineering or design-oriented. For example, a design-oriented course and a mathematics course cannot be taught in similar styles.

The content itself constitutes a major condition for instruction. If you take a course like material science, with which I had some experience, that is extremely important for many branches. Whichever way you look at it, either it will become too science-oriented or it will become too descriptive. In either way an engineering student may not see any value in that immediately. We can only say the curriculum says it is essential for you. But the student himself does not feel the importance of material science in his branch, especially when it is offered at the second or third-semester level.

Instruction in these descriptive courses can be quite challenging because no student really wants to keep on listening to some material where there are no problems to be solved, or he does not immediately see what the value is that. It is something like a necessary evil through which he has to go through. Making it enjoyable presents a significant challenge to the teacher. You can also have courses that are highly mathematical in nature and/or has several abstract concepts that are difficult to grasp.

Instructing such a course is challenging in a different way. How do you bring it down to the level of your students where they feel comfortable in learning?

Some courses are challenging for different reasons. For example consider the courses Circuit Theory and Electromagnetics. Everybody considers they are essential but most to the students find them uninteresting the way generally it is presented and in the process when they do not absorb all the concepts and related mathematics, and they do not perform well in those courses. It is evident all courses have to be described in terms of course outcomes. You may also give a list of topics, but in today's context of outcome-based education, every course will have to be described in terms of course outcomes.

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Communication: Teaching is primarily a communicative process; you are communicating something to the student. That means you are giving a message to the students and if the students have to internalize that message or they have to understand the message. Therefore, rules for communication and the communicative competence of both the teacher and student in the classroom will influence the attainment of outcomes. There is a communicative competence - as a teacher, you can find out the entire spectrum (very poor to very good) is covered by the community of teachers.

Unfortunately when somebody is not so good at the beginning of the career, very few people make attempts to improve their communicative competence. They just start and possibly almost stay at the same place throughout their careers. Students also may not be

having adequate communicative competence, because his facility with English or in the language that is communicated may not be adequate, so, he/she may not understand every word of every sentence that is spoken in the classroom.

This communicative competence of both students and teachers will have a significant influence on the attainment of outcomes. But teacher determines the structure and direction of instructional conversations. You have several instructional conversations. These conversations would mean if you allow students to ask you questions, student will ask a question, then you answer or other times you are presenting, and the student is listening or possibly seeking clarifications.

But the structure or the rules of these instructional conversations are generally determined by the teacher. Each teacher either implicitly or explicitly states these rules right in the beginning. For example, a student will know in which class he can actually ask a question and in which classy he cannot. The teacher determines the structure and direction of these conversations.

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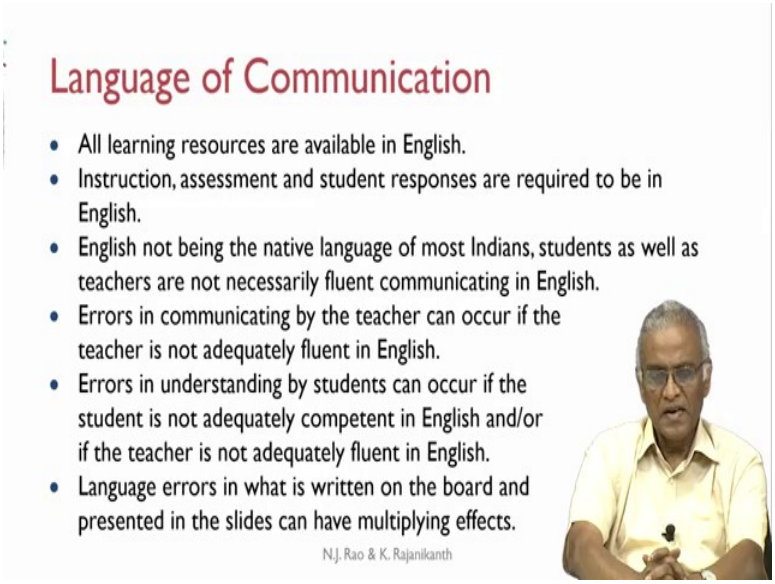

The language of communication is particularly crucial in countries like India. First of all English is not our native language, all of us have grown in our own languages. Some privileged students do their education from primary to 12th standard in English. Some do it in local languages. By the time they enter the professional program like engineering,

the facility with English is not uniform for all students. A significant percentage of the students are not that comfortable with English.

But all learning resources are available in English. Books are not expensive; there is plenty of information on the internet in various forms, so availability of learning resources is not an issue. A few years ago access to textbooks was an issue unless library stores large number of copies of textbooks. Instruction, assessment and student responses are required to be in English, and in most institutions there is no choice. English not being the native language for most Indians, students, as well as teachers, are not necessarily fluent communicating in English

For example, if a teacher is not very fluent in English, there can be errors in communicating with the teacher. These errors sometimes are either identified by the student, and sometimes they do not. In either way it will influence the learning by the student. Errors in understanding by the students can also occur if the student is not adequately competent in English and on top of that if the teacher is not adequately fluent in English. Not so fluent a teacher communicating to a student not so competent in Englis; is a source of any number of misunderstandings and errors. Language errors in what is written on the board and presented in the slides can have multiplying effects. The first tendency of any student is to accept whatever is presented by the teacher as right. Even if the student sees the contradictions, he may rise or may not rise.

All the students carry with them whatever that is written on the board or presented in the slides. Sometimes throughout their life and until they face an interview and the interviewer can find fault with the presentations.

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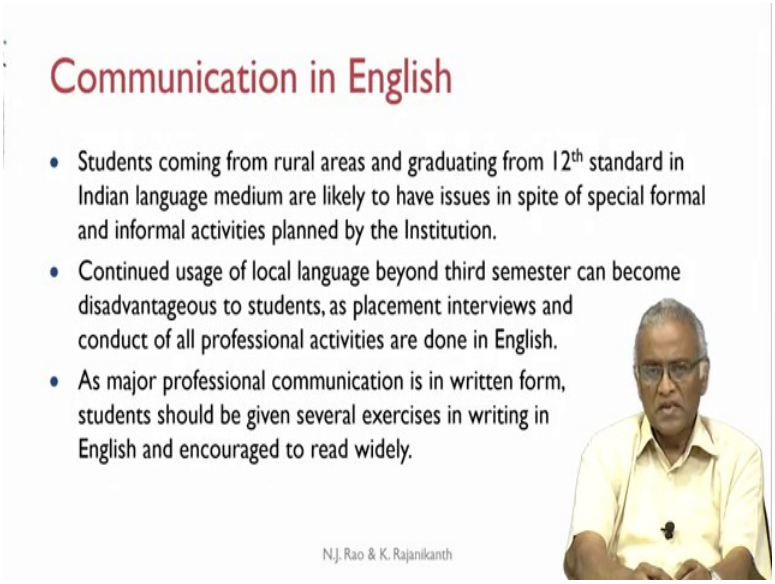

Further, students from rural areas and graduating from 12th standard in Indian language medium are likely to have issues, in spite of the institutions having several special formal and informal activities to improve their communication abilities in English. Several colleges have established language labs to make sure this gap is filled, but that gap is filled to the best effort they can put in, but the language gap does not easily get resolved unless the students put tremendous amount of effort.

Some of the teachers just to carry the students along, will start presenting information using the local language. While you may write something on the board in English, but you keep using more of local language and using, of course, the technical words in English. That serves some purpose, but doing this beyond third semester can become disadvantages to the students. Because the students have to face placement interviews and also all professional activities that they are required to do are all conducted in English.

If you are not up to the satisfactory level by the time you start attending placement interviews, and you come to the stage of writing project reports, the student is at a significant disadvantage. This is a problem where the language in which you do your higher education is not the same as your mother tongue.

Right from the first semester, the student should be given several exercises in writing and value them, just not giving the exercises, but there should be summative assessment of

the performance of the student in that. The student should be encouraged to read widely. Reading widely in English will significantly improve your language.

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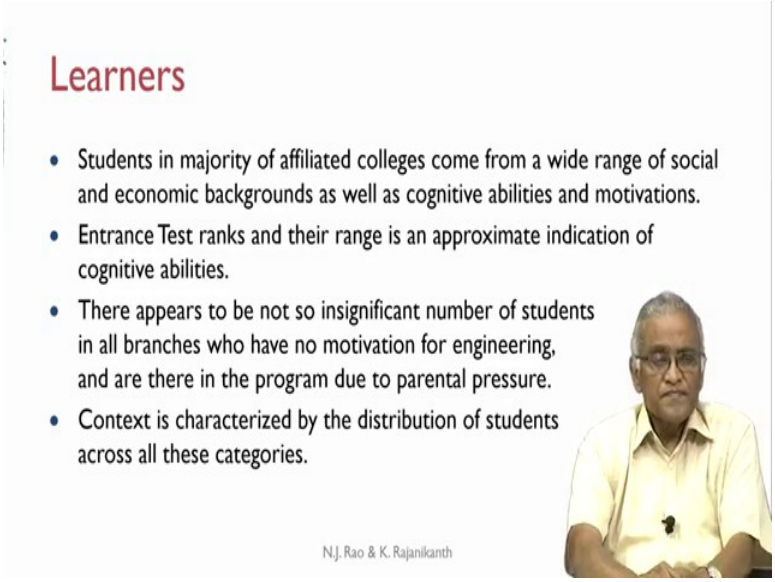

Learners: students in the majority of affiliated colleges come from wide range of social and economic backgrounds as well as cognitive abilities and motivations. The higher education has been expanded, and on top of that, for variety of either political or social reasons, the admission barriers have been insufficiently reduced. (Anyone who passed is eligible for engineering program.)

As a result, what happens is, many colleges get students with inferior cognitive abilities and motivations. Teaching engineering, especially mathematical subjects to students with poor cognitive abilities is a challenge unless the students are willing to cooperate. For example, entrance test ranks and their range is an approximate indication of the cognitive abilities of the students. It can be used as a proxy. Otherwise, you have to do very complicated surveys and/or tests.

Also, because of the kind of parental pressure, many branches (practically it is common to all branches) (it is not insignificant number of students,) you find reasonable number of students who have no motivation for engineering because they are there because of parental pressure.

When somebody is not interested in engineering and you push through him he becomes a liability, both to the teacher, the college and to the parents. A context is characterized by the distribution of students across all these categories, and if the context is too widely distributed over all these parameters then it becomes a challenge to the teacher.

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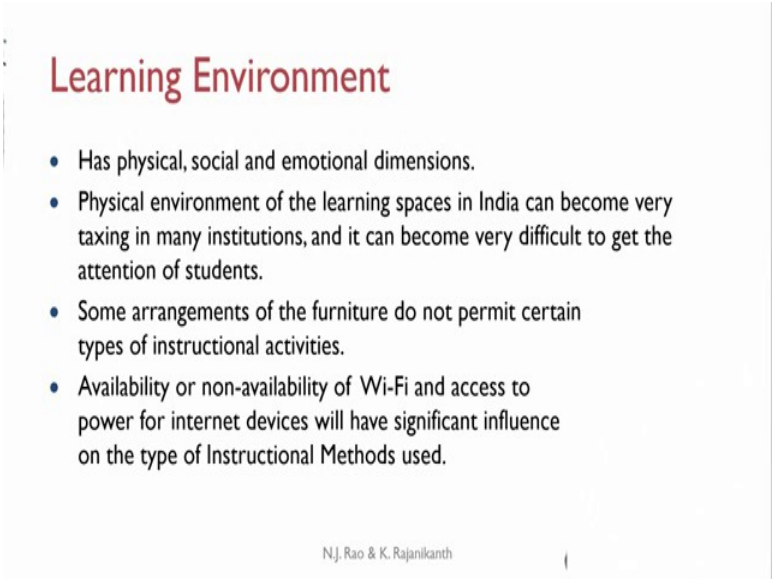

Learning environment: it has physical, social, and emotional dimensions. The physical environment is the learning space. In most colleges in India, especially in summer months, classrooms have fans running, and adding to background noise, students can hardly hear the teacher just a few rows away from the teacher. A very small number of institutions have the facility to air-condition the classrooms.

As it is students have many issues that influence them; on top of that if they are not able to hear the teacher properly, and if the teacher loses the attention of students it is the end of learning. If if I am not paying attention there is no question of learning. Some arrangements of the furniture do not permit certain types instructional activities.

Availability or no-availability of Wi-Fi and access to power for internet devices will have significant influence on the type of instructional methods used. Then you are confined to using the blackboard, or if you have a projector only to present the PPTs.

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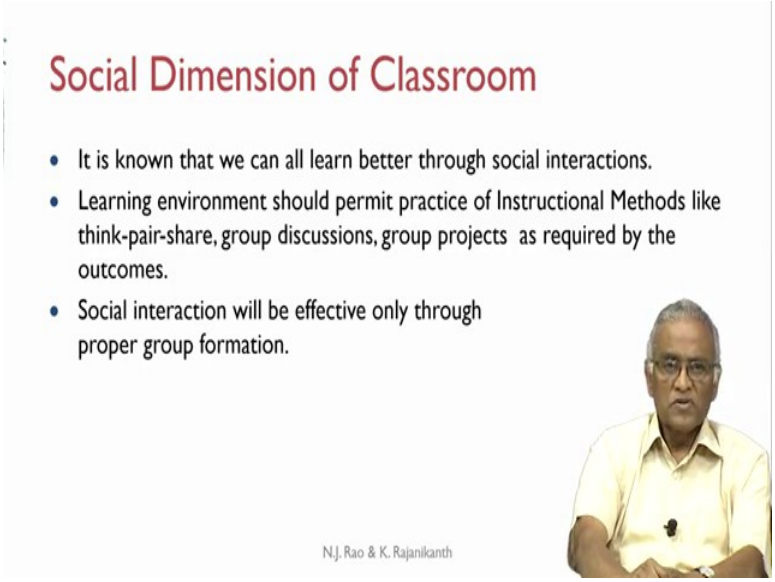

The social dimension of the classroom: it is known that we all learn better through social interactions. The students will discuss with each other, outside the classroom, many of them would like to interact with each other and learn. The learning environment also should permit instructional methods like think-pair-share, group discussion, group projects as required by outcomes.

If you want to do that, obviously, you have to form the groups well. If you want the group project to be done, group discussion to be effective, there should be right kind of group formation; otherwise again the instructional method will become useless.

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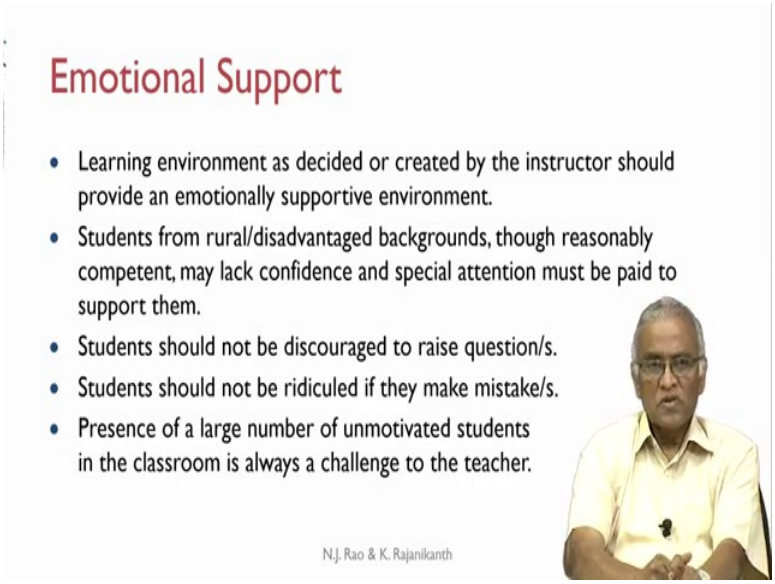

Emotional support: First of all, whatever environment that you are creating (which dominantly has to be created by the teacher,) does the student find it emotionally supporting?

For example, students from rural or disadvantaged backgrounds, though they are reasonably competent, will always lack confidence. In fact, there are programs implemented to enhance this level of confidence, but it cannot be done for all. Special attention must be paid to provide support so that they do not become further timid and kind of get withdrawn.

One has to provide some activities, some mechanisms to enhance their confidence. They should not be discouraged to raise questions, should not be ridiculed if they make mistakes. The presence of a large number of unmotivated students in the classroom will always present a challenge to the teacher because they have to engage themselves in the class because attendance is compulsory; they will be doing other activities and disturbing the other people. ‘Winning over unmotivated students into the classroom’ is what every teacher will have to address in many Tier 2 colleges.

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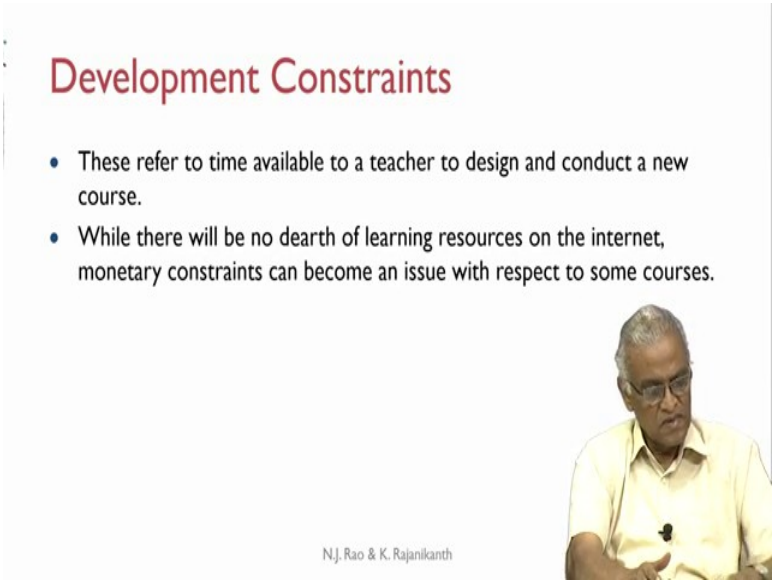

Development Constraints: a teacher may be asked to design and offer a course with a short time notice, and that can become a challenge. Even if learning resources are available on the internet, there could be monetary constraints with regard to some courses, at least.

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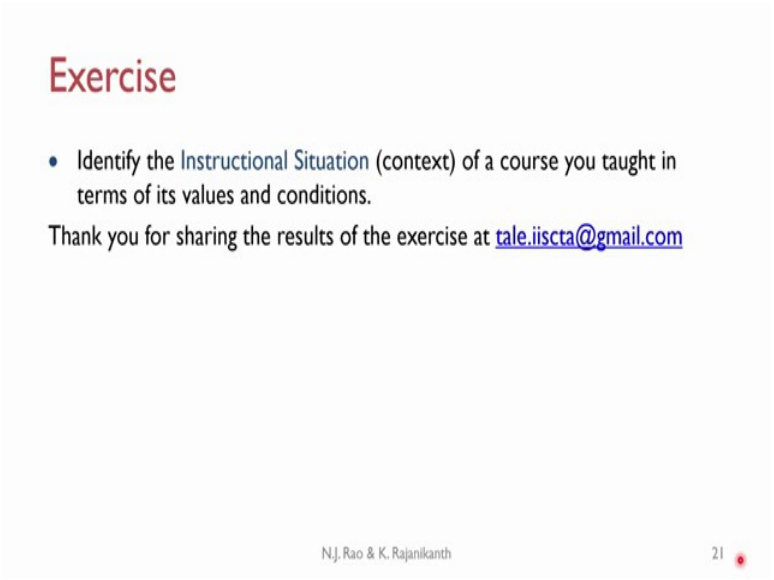

Exercise: Identify the instructional situation or the context of a course you taught in terms of its values and conditions. We have explained what values and conditions, it

need not have to be exactly strict to the titles, but you can identify the instructional context, and we would appreciate if you can share the results of your exercise.

In the next Unit, we will look at how brains learn after learning takes place in the brain, and every teacher should have some knowledge of how the brain functions at least at our present level of understanding and to the extent what influence does it have it on learning.

Thank you very much for your attention.